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ABSTRACT

The authors of this planning review claim that educational research and development has been underfunded, has had less than distinguished standing in the scholarly and scientific community, and has had little national leadership. They assert that the National Institute of Education (NIE) is intended to bring about an improvement on all three counts. Consideration is given to some of the problems that must be confronted if NIE is to have a substantial influence on the conduct of American education. Proposals are made for the initial incorporation of six components felt to be essential in the organization of NIE: R & D Centers and Regional Laboratories; a National Educational Laboratory; extramural R & D, supporting investigator-initiated grants and programmatic research; research manpower training; institutional development for research; and functions specifically transferred from OE. Assuming an initial funding of 125 million dollars, the authors have prepared an approximate budget suggesting the appropriate emphasis for each of these components. (Author)

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A MODEL FOR NIE

A Review of

Organizing for Innovation:

Alternative Designs for the

American Educational R & D System

Prepared by a Committee
of the
National Academy of Education

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FOREWORD

On February 29, 1972, Dr. Harry F. Silberman, Director of the Planning Unit for the projected National Institute of Education, requested the National Academy of Education to have a small group of from five to ten people "review a planning document describing alternative organizational models for NIE" and react to "the premises underlying the models and the statements of relationship between the models and the goals they purport to advance." After conferring with the officers of the Academy, I telephoned Dr. Silberman on March 1 to accept his invitation, and we set April 17, 1972, as the due-date for the Academy's review. A letter confirming that acceptance went to Dr. Silberman on March 3, 1972

Shortly thereafter, once again following consultation with the officers of the Academy, I asked a committee composed of Ernest R. Hilgard (Chairman), Stephen K. Bailey, J. W. Getzels, John I. Goodlad, H. Thomas James, Francis Keppel, James G. March, Patrick Suppes, and Ralph W. Tyler to undertake the assignment on behalf of the Academy. The choice of these particular members was dictated in part by the range of scholarly expertise and professional experience they would bring to the task and in part by the fact that five of us (Goodlad, Hilgard, March, Suppes, and I) were located in the Stanford area and could therefore conveniently serve as an informal drafting subcommittee in the preparation of the committee's report.

The committee met in Palo Alto, California, on March 19-20, 1972, (having received the NIE planning document in advance), with Joel S. Berke, the Academy's Executive Assistant, as reporter and Judith F. Suratt, my own assistant for Academy affairs, as his aide. On the basis of the discussion and of individual comments submitted by the several committee members, the chairman, assisted by the others in the Stanford area, prepared a draft of the present report, which was then circulated to the committee for comment and criticism during the week of March 26. A final version of the report was then prepared, taking their suggestions into account.

The report as it has emerged represents a consensus of the committee members. It has not been reviewed by the other members of the Academy and hence must be regarded not as a statement of the Academy as a whole but as the view of the ten members who served on the committee.

Lawrence A. Cremin

April 14, 1972

1. THE REPORT UNDER REVIEW

According to its preface, the document under review will become part of a Preliminary Report on the National Institute of Education (NIE), prepared by the Planning Staff of the Assistant Secretary for Planning and Evaluation in the Department of Health, Education, and Welfare.[1]

Section II of the Report[2] presents seven models for organizing the NIE. Most of these are elaborated under the following rubrics: basic premises of the model, primary management emphases, organization (including detailed organizational charts), rudiments of operation, staff, and linkages to the Office of Education (OE), and to practice. The committee believes that it is possible to achieve some unification of the models, without choosing among them and without proposing an eighth model, which would merely heighten the uncertainty about how best to proceed. We address ourselves to such an integrated model reflecting many of the suggestions from the report in our attempt at synthesis.

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1. The document being reviewed is identified as a "working note" prepared by John Wirt, Arnold Lieberman of RAND, and Lyle Spencer of the staff of HEW, Number WN-7793-HEW, February 1972. The first 71 pages of the report reached the committee in time for thorough study.

2. References to "the Report" will mean the document ("working note") under review.

2. ORGANIZATIONAL PLANNING AT THIS STAGE

In planning an organization for NIE it must be recognized that the new agency is not free of its roots in present operations of OE; some existing functions will be transferred directly, and, at first, new functions will constitute only a modest part (perhaps a fourth or fifth) of the budget. Realistic planning must respect prior commitments in the transition to the new organization.

At the same time, a prime justification for NIE is the expectation that it will effect changes. As the Report states: "The overriding objective behind the initiative to establish NIE is to improve educational practice through research and development" (page 1). Educational R & D has been underfunded, has had less than distinguished standing in the scholarly and scientific community, and has had little national leadership. NIE is intended to bring about a substantial improvement on all three counts.

Changes of the magnitude desired cannot be made without producing tension, and to suppose that there is some "ideal" or "rational" plan that will meet all contingencies is to fail to understand the nature of organizational change and innovation. In view of the many uncertainties and eventualities, the committee believes a firm table of organization would be premature at this stage. Some patterns (at the inherited program level) will remain essentially intact; new patterns will have to emerge as new programs achieve their appropriate sizes and capabilities. A strong director will want to adjust the details to the special problems that he confronts and to the particular personnel associated with him.

The Report sets forth its problem by stating a number of goals for NIE and then sketching alternative organizations and strategies for achieving those goals with different emphases and in different balances.

The goals are of various levels of generality and significance (the "research function" stands co-equal with the "R & D capability-building function"), and the organizations and strategies are explicated at various levels of detail (not all goals are dealt with explicitly in all models). On the whole, a highly uncertain linear model of improving educational practice through research and development is assumed: improvement proceeds from research to development to dissemination to adoption. And allusions to specific instances, illustrations, or events are absent: the emphasis is on intellectual possibility rather than practical feasibility.

Whatever the intent of the several models sketched in the Report, there is no mistaking the very real historical parallels they call to mind. In Model I, NIE is essentially a funding foundation responding to the extramural research communities relevant to education, such as the Carnegie Corporation of New York or the Ford Foundation. In Model II, NIE is partly a research institute and partly a funding foundation sponsoring extramural research extending the activities of the institute, such as the National Institutes of Health. In Model III, NIE is partly a research concentrator and coordinator and partly a funding foundation sponsoring extramural research along certain internally determined lines, such as the R & D effort of the National Aeronautics and Space Administration. In Model IV, NIE is essentially a problem solver, such as the RAND Corporation or SDC in relation to the Air Force. In Model V, NIE is partly a problem solver (RAND Corporation) and partly an organization to oversee the present activities of the National Center for Educational Research and Development (NCERD). In Model VI, NIE is for all intents and purposes an expanded NCERD. And, in Model VII, NIE is in effect a funding foundation for cooperative action research in the field, calling to mind the several university-based school

study councils of the 1950's. The models and their analogues are summarized in Table 1.

Each of these historical parallels naturally suggests certain strengths and weaknesses. For example, Model I would doubtless stimulate the growth of the several sciences pertinent to education and do much in the process to improve the quality of the educational research community.[1] The question remains, however, whether and how that growth would eventually contribute to the improvement of educational practices, and there is evidence on both sides -- consider, for example, the substantial bearing of learning theory on educational practice during Edward L. Thorndike's era and the lack of such bearing during the later era dominated by Clark L. Hull and other learning psychologists. Similarly, Model VII would doubtless ensure that the research effort would bear on practice, but the record of the action-research community during the 1950's was not such as to engender confidence that the research would be systematic, productive, or even of very high quality.[2] On the other hand, there is enough known about the performance of NIH, NASA, the RAND Corporation, and NCERD in recent years to venture some fairly useful judgments as to their relevance for NIE. The supply of first-class personnel to staff the organizations would, of course, be a matter of the greatest significance, since even with the researchers and developers newly trained under the provisions of Title IV of the Elementary and Secondary Education Act of 1965, the number of able people remains pitifully small in relation to genuine national needs. Finally, it is useful to note that not all the historical instances that come to mind are represented in the several models. An educational Bureau

1. The Academy's Committee on Educational Research detailed the historic weaknesses of this community in its 1969 report: Cronbach, L.J., and Suppes, P. (Editors), Research for Tomorrow's Schools: Disciplined Inquiry for Education. New York: Macmillan.

2. See Research for Tomorrow's Schools, pp. 66-68.

Table 1

THE PROPOSED MODELS AND SOME ANALOGUES

Model	Characteristics of Model	Analogue	Characteristics of Analogue
I. Develops R & D Resources	A primarily extramural program giving priority to R & D manpower, institutional development, advances in knowledge and product resources.	Carnegie Corporation Ford Foundation	Makes grants to extramural research agencies to advance knowledge and practice.
II. Emphasizes Programmatic R & D	Coordinates R & D efforts; emphasizes a few large programs directed to the solution of chronic educational problems.	National Institutes of Health	Some of the programs of NIH and NIMH have been massive attacks on specific health problems; e.g., heart diseases, cancer.
III. Concentrates R & D Activities	This is a primary intramural plan emphasizing the "critical mass" effect; it hopefully will make delivery of innovation easier because of emphasis on program evaluation.	NASA	Here is a mission-oriented agency with a specific R & D task to accomplish. It contracts out parts of the task, but retains initiative.
IV. Solves Practical Problems Nationally	Practical concerns are paramount; solutions through linkages separate from NIE; once program has been selected nationally, a good deal of independent authority. Performing community generates ideas.	Air Force in relation to RAND and SDC	The problem is assigned out to RAND or SDC and then the extramural agency takes over and works on a large scale.
V. Feeds-Back Practical Needs	Mostly extramural (1/2 extramural R & D program 1/2 Regional Labs and R & D Centers); builds linkages for feedback on (a) assessment of problems and (b) effectiveness of products.	NCERD	The National Center for Educational Research and Development has heretofore operated very much in this manner.
VI. Solves Practical Problems Regionally	Regional R & D labs supported by formula grants to which state and local contributions are made; Federal influence through evaluation of high priority projects.	NCERD	Emphasizes expanded Regional Laboratory concept. (Funding differs)
VII. Builds Linkages to Practice	Practitioners and school administrators heavily involved. Regional Councils play important role. Staff of NIE stands by to help.	University-based School Study Councils	These served to do local field research.

of Standards ought to be contemplated along with other models, as should an educational National Bureau of Economic Research. And there are doubtless others that would occur in any wide-ranging canvass of the possibilities.

3. THE ESSENTIAL COMPONENTS OF NIE: AN INTEGRATED MODEL

The various models, taken collectively, stress a number of problems that must be confronted by NIE if it is to have a substantial influence on the conduct of American education. The agency must remain continually sensitive to the real world of schools, colleges, libraries, vocational training programs, and the like, so that its research and development efforts can be addressed to genuine problems of learning and instruction. It must nurture close working relationships with many different communities of investigators and developers if its work is to be at the frontiers of knowledge and innovation. It must strive to increase the attractiveness of careers in educational research and to assist in the recruitment and training of educational research personnel. And it must develop reasonable policies with respect to a host of questions such as the balance between basic and applied research, or between intramural and extramural research, or between ongoing and new research.

In effect, each of the models takes one or another of these problems as pre-eminent and attempts to develop strategies and organizations for solving the problem. But the more we analyzed the common and discrete elements in the several models, the more we realized that what are proposed as a series of either-or choices in the Report can be fruitfully formulated as a series of priorities and emphases in an integrated model that brings together a variety of elements. Indeed, most of those elements have been associated with NIE since it was first formally proposed in the winter of 1969-70.

With such a reformulation in mind, we have arrived at a number of components that appear to us essential in any initial organization of NIE:

1. <u>R & D Centers and Regional Laboratories</u>. The existing university-based R & D Centers and independent Regional Laboratories have had a very brief existence. They can doubtless be improved, but it would

be foolhardy to abandon them. There are several recent reports on their programs and prospects, and it would seem minimally prudent for NIE to examine these reports closely with a view to encouraging and expanding those activities that have proved fruitful and discontinuing or redirecting those that have not.[1]

2. A National Laboratory of Education. A National Laboratory of Education should be established in or near Washington as an intramural research facility. It should be able to attract distinguished scholars, comparable to those drawn to NIH and NIMH, and their research endeavors should stand as models for educational research elsewhere. Beyond the actual conduct of their own studies, these scholars should be constantly appraising the need for various possible lines of investigation and developing methods appropriate thereto. In addition, they should spend some fraction of their time as high-level consultants to other NIE programs. The emphasis within the National Laboratory of Education should be on quality of research, and the Laboratory should grow slowly consonant with its ability to attract high-level scholar-scientists to work on educational R & D. One benefit to the NIE will be that these trained research workers, loyal to NIE, will serve as recruiting ground for high-level management personnel, just as universities commonly call on their distinguished faculty to fill deanships and to serve other administrative responsibilities.

3. Extramural R & D, supporting investigator-initiated grants and programmatic research. There are many precedents in the history of OE, NIH, NIMH, NSF, and other agencies, for the support of investigator-

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1. See, for example, Chase, F.S. Educational Research and Development in the Sixties: The Mixed Report Card. Background paper submitted to Select Subcommittee on Education, U.S. House of Representatives, Spril, 1971; Baldridge, J.V. and Johnson, R. The Impact of Educational R & D Centers: An Analysis of Effective Organizational Strategies. A research project sponsored by the National Academy of Education, Stanford, California: Stanford University School of Education (To appear, Spring, 1972).

initiated research, in universities and other non-profit institutions. The scale of these has varied from grants for small pilot studies to substantial programs carried out over a number of years. Some of the programs have been investigator-initiated, but others have originated at the staff level, to call attention to the need for research in neglected and urgent areas. The R & D Centers and Regional Laboratories of course represent substantial ventures in extramural research, and certain of the programs transferred from OE to NIE will also have extramural components. In any case, it is anticipated that some new programs for the support of extramural research, similar in format to those supported by the other agencies mentioned above, will gradually develop. The educational enterprise is too widely dispersed for its research efforts to be concentrated solely in a few places.

4. Research manpower training. If educational research is to be upgraded, the NIE will have to provide opportunities and inducements to attract and train able young men and women from a variety of disciplines and professional fields. One way of doing this is to assure that university-based educational research training programs are amply supported. Another way would be to provide opportunities for post-doctoral fellowships at various levels in connection with the intramural and extramural programs of NIE.

5. Institutional development. Recognizing that many problems of education are specific to particular areas of the country, opportunities for both training and research need to be widely dispersed. Some attention therefore may well be devoted to block grants to individual universities where need is great and potential promising, and where specific institutional assistance may help in the national effort to improve educational R & D.

6. Function specifically transferred from OE. If the NIE is to fulfill its responsibilities, it must provide appropriate incorporation and management of the ongoing activities and programs specifically transferred to it from OE.

One or another of the foregoing six components appear in a number of the models of the Report, but we have assembled them in this manner because we do not see how the NIE will be viable unless all are included. Model I gives special attention to manpower training and institutional development; Model II stresses intramural research; Model V gives direct reference to Regional Laboratories and R & D Centers; all but two of the models give significant consideration to extramural research.

What should be the relative emphases given to each of these six components? The precise details must remain a matter of negotiation and adjustment, but to be as concrete as possible we have prepared an appropriate (if highly approximate) budget, which assumes an initial funding of $125 million (Table 2). This budget is a compromise, based on existing commitments, and the expressed hope is that, in time, some of the transferred funds can be freed from such commitments. Our proposed budget has been compared with a tentative budget from within OE, which came to our attention following our committee meeting (Table 3). Such comparison indicates that what we have proposed is entirely realistic.

Were we free to choose, we might not select the particular programs proposed for transfer from OE to NIE, but this is not a matter of serious issue with us. It is wise for NIE to begin with a partially committed budget, and perhaps it is just as well not to have too much discretionary money during the period when the new organization is brought into being. The transferred programs should be treated with respect, and their commitments, both to staff and to field, recognized.

Table 2

AN APPROXIMATE INITIAL BUDGET FOR NIE, IN ORDER TO INDICATE RELATIVE EMPHASES ON COMPONENTS

Item	Approximate Budget (in millions of dollars)	
FUNCTIONS TRANSFERRED FROM OE		
R & D Centers and Regional Laboratories	$40	
Extramural research (unsolicited and programmatic)	50[a]	
Other transferred functions	10	
		$100
FUNCTIONS SPECIFIC TO NEW FEATURES OF NIE		
Total		
National Laboratory of Education	5[a]	
Research manpower training and institutional development	10	
Administrative (including scholar-administrators)	10	
		$ 25
TOTAL		$125

a. Of the funds specified for R & D, an established fraction, perhaps 10 to 15%, to be reserved for research fundamental to the problems of education.

Table 3

TENTATIVE FIRST OPERATIONAL YEAR BUDGET

FOR NIE, AS PROPOSED BY OE STAFF

Item		Funds to be Obligated (in millions of dollars)	
FUNCTIONS TRANSFERRED FROM OE			
R & D Centers and Regional Laboratories		$30	
Experimental Schools		30	
Career Education		25	
Other R & D		15	
Basic Research	5		$100
Handicapped and Technology	5		
Research and Training	3		
Other	2		
FUNCTIONS SPECIFIC TO NEW FEATURES OF NIE			
Total			
Programs to be developed		15	
Administration		10	
			$ 25
TOTAL			$125

Source: Staff of OE, March 21, 1972

4. FEDERAL SUPPORT OF R & D IN EDUCATION

If it is to serve its primary purpose, NIE through its demonstrated effectiveness must be able to attract adequate support for educational research in general, and adequate support for fundamental research in education. In the footnote to Table 2 we proposed that 10 to 15 percent of the research budget, both extramural and intramural, be devoted to basic research pertinent to the problems of education. To show that these figures are sensible, not completely arbitrary, and not out of line with the contemporary Federal emphasis upon research applied to the solution of social problems, we have made some comparative analyses of Federal support of research in education as related to research support in other fields.

Educational research in relation to the size of Federal expenditures on educational programs. The total estimated direct support of education by the Federal Government, as specified in the Budget of the United States Government, Fiscal Year 1973, is $9.4 billion.[1] The amount specified for research in education, $104 million[2], represents a mere 1 percent of the total Federal education expenditures.

In the health field, by contrast, the total outlays from Federal and trust funds are estimated at $26 billion.[3] The outlays for health research are estimated at $2 billion.[4] Hence research represents 8 percent of the total Federal health expenditures -- eight times the 1 percent of educational expenditures devoted to research.

Such comparisons are subject to a margin of error, but even allowing for this the conclusion seems justified that research is not

1. Special Analyses, Table I-1, page 118.
2. Special Analyses, Table I-8, page 126.
3. Special Analyses, Table K-2, page 154.
4. Special Analyses, Table K-4, page 158.

receiving its appropriate share of total educational funds. It might even be argued, given the need for critical mass, that research should represent a larger fraction of a field in which total expenditures are smaller. Hence a comparison between the actual dollars available for research in health and education should also be made. In that comparison education suffers even more: $104 million for research in education compared with $2 billion for health, a ratio of nearly 1:200.

Relative support for basic research in education. If we accept the categorization of research into basic, applied, and development, as reported annually by the National Science Foundation, it is possible to compare the amount of total R & D going into basic research in education, with the amount going into basic research in the social sciences. Unfortunately, the best figures available are somewhat old (fiscal 1967), but the proportionalities between agencies are doubtless of the same order of magnitude today (Table 4). Of the total behavioral and social science R & D that was being supported in agencies other than OE, basic research received 36 percent, but in OE research the amount was only 7 percent. Because education shares many of the problems of the other behavioral and social sciences, this is a genuine discrepancy.

One can also compare the amounts spent for basic research by OE with the amounts spent by the National Institutes of Health and the National Science Foundation. These two agencies offer the closest parallels within the Federal government of experiences bearing on the NIE. Some comparative figures are provided in Table 5. It is well known that the proportion of the NIH and NSF budgets in these agencies for basic research is being reduced, probably more rapidly than the figures of Table 5 indicate.[1, 2] This comparison, which includes basic research in the biological sciences and physical sciences, reveals basic research in education to be at the same

1. See, for example, Gillette, R., Shapley, D., and Wade, N. "1973 Budget. Administration Bets on Applied Science." Science, 1972, 175, 389-392.

2. We are aware that the dollars for estimated obligations in 1970 and 1971 in Table 5 do not correspond with expenditures during those years.

Table 4

Federal Obligations for Basic Research, Applied Research, and Development; Office of Education and in Behavioral and Social Sciences; All Other Agencies

Fiscal Year 1967

	Office of Education[a]		All Other Federal Agencies		Total All Federal Agencies[b]	
	Thousands of Dollars	Per cent	Thousands of Dollars	Per cent	Thousands of Dollars	Per cent
Basic Research	$ 5,565	7	$111,368	36	$116,933	30
Applied Research	40,966	49	138,850	44	179,816	46
Development	36,059	44	60,941	20	97,000	24
Total	$82,590	100	$311,159	100	$393,749	100

a. Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1967, 1968, and 1969. National Science Foundation, Vol. XVII, NSF 68-27, August 1968.

b. Basic and applied research from source in Note a; development estimated by staff of Behavioral and Social Sciences Survey Committee from Data in that source.

Table 5

Research and Developmental Funds
Obligated for Basic Research, Applied
Research and Development
(thousands of dollars)

Agency		Fiscal 1969 (Actual)		Fiscal 1970 (Estimated)		Fiscal 1971 (Estimated)	
		$(000's)	%	$(000's)	%	$(000's)	%
Office of Education	Total	96,778	100	87,994	100	119,858	100
	Basic	7,483	8	7,324	8	6,771	6
	Applied	31,557	33	27,350	31	54,906	46
	Development	57,738	59	53,320	61	58,181	48
National Institutes of Health	Total	892,925	100	862,679	100	959,492	100
	Basic	288,547	32	278,141	32	294,650	31
	Applied	599,536	67	580,031	67	657,490	68
	Development	4,842	1	4,507	1	7,352	1
National Science Foundation	Total	273,790	100	294,173	100	364,004	100
	Basic	247,589	90	254,600	87	293,239	81
	Applied	10,826	4	24,741	8	55,304	15
	Development	15,375	6	14,832	5	15,461	4

Source: Federal Funds for Research, Development, and Other Scientific Activities. Fiscal Years 1969, 1970, 1971. National Science Foundation, NSF 70-38, Volume XIX, 1970.

disadvantage as it is when compared with basic research in the social sciences.

It should not be necessary to make any special plea for modest but firm support for basic research, defined in terms of its potentials of relevance to education. Some of the arguments for including fundamental research in an agency devoted primarily to mission-oriented research are:

1. A program of basic research keeps the agency alert to developments at the frontiers of knowledge.

2. A complement of basic researchers working at the frontiers of knowledge maximizes the possibility of innovation.

3. Basic research scholars in the intramural program, committed to the National Institute of Education, could become a fine group from whom to recruit management personnel.

4. An output of basic research is evaluated by the scientific and scholarly community, and keeps the quality of the technical capability in proper perspective.[1]

In favoring some residual but protected amount for basic research we need to make clear our position with regard to the categorization of research into basic, applied, and developmental. These terms are used in government reporting of science activities, and, with all the difficulties in assigning a particular research project to one category or the other, they do point to some important distinctions.[2]

One of the long-range goals of NIE must be to give educational research a new leadership and to improve educational R & D over its whole spectrum. Only if sufficient support is given to fundamental research, however, will the scientific and scholarly communities respond fully to the research

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1. Similar points have been made to justify basic research in industry, by the man who headed Ford Motor Company Research for 10 years. Goldman, J.E. "Basic research in industry." In Allison, D. (Editor) The R & D Game. Cambridge, Mass.: MIT Press, 1969, 198-211.

2. A National Academy of Education committee several years ago found it useful to distinguish between "conclusion-oriented" research and "decision-oriented" research. See Cronbach, L.J., and Suppes, P. (Editors) Research for Tomorrow's Schools, Disciplined Inquiry for Education. Report of the Committee on Education , Research of the National Academy of Education. New York: Macmillan, 1969. The distinctions referred to are discussed on pages 19-27.

opportunities within education. The foregoing considerations bear on our recommendation that some fixed amount of the NIE R & D budget of the order of 10 to 15 percent, both intramural and extramural, be specified for fundamental research pertinent to education. We should add that the National Academy of Education, acting in collaboration with the National Research Council, has recently completed a pilot venture seeking to define the potentials of basic research in education. This venture serves to illustrate concretely how disciplines ranging from biochemistry to political science can contribute to the understanding of educational phenomena.[1]

The linear model in educational research. Along with our emphasis on the need for a part of the budget protected for fundamental research, we recognize that educational research is "mission-oriented" and that the rest of the R & D budget (85 to 90 percent) will be assigned to research and development directed toward the solving of current and foreseeable educational problems.

The Report tends to rely on a linear model of the relationship between basic research, applied research, development, and dissemination; that is, it favors the implication that fundamental research arrives at generalizations that can then be converted into propositions useful for educational practice that are then tailored through development into "products" that can be "marketed" to the educational community as the "clients" of educational R & D. We have grave reservations about this model, as applied historically to the relationship between science and technology, but especially as applied to education.

The linear model is appropriate when a product results from R & D activity, and is then ready to be "marketed." Some educational innovations are of this sort, such as technological inventions, instructional materials,

1. Report of the Committee on Basic Research in Education. Prepared jointly by the National Academy of Education and the National Research Council. Washington, D.C.: Division of Behavioral Sciences, National Academy of Sciences-National Research Council. (To appear, 1972).

or tested curricular sequences. Many educational innovations are hard to conceive of as products, however; they may include types of educational reform that call for changes in school financing or school management, as well as changes in instructional practices; they may involve new school-community relationships, such as a continuing education program that calls for cooperation between the more usual schools and educational training efforts within industry. In these socially important instances the relationship between those producing R & D results and those who are in position to introduce educational innovations is complex, and ordinary "marketing" practices that hold for new products in other fields of technology break down. Special attention has to be given to the potential users of educational research results to see, first, that they are aware of the possibility of improvement in their practices, second, that the improvements are feasible within their local settings, and, third, that they are not frightened by the consequences of change. Resistance to educational innovation is widespread, for reasons that need not be enumerated here; NIE will make a contribution if it can discover how this resistance can best be circumvented. Eventually feedback arrangements in which the needs of the "clients" for educational research are reflected in the kinds of investigations that are undertaken will result in a greater impact of research upon practice than now exists. With this greater impact, widely dispersed, should come a mass base for the support of the research effort, which would augur well for the survival of NIE in its competition with other agencies.

Granting the usefulness of some distinctions between research categories, we wish to state emphatically that we reject an oversimplified linear model that proposes that applied research must wait upon basic research and development wait upon applied research. Within each category of

research and development there is a place for inventiveness, for originality of design, and for contributions of both method and substance that may have a feedback interaction with research in other categories.

5. SPECIAL PROBLEMS IN INITIATING AND DESIGNING NIE

The primary organizational concerns for NIE are only moderately related to the details of organizational charts. Instead of providing such a chart to undergird the integrated model that we have proposed, we shall proceed in the following paragraphs to note some of the decisions to be either reaffirmed or made anew, and some of the considerations bearing on these decisions.

The independent status of NIE. Our committee supports the recommendation in the bill proposing the NIE that its director be co-equal with the Commissioner of Education, and report directly to the Secretary of Health, Education, and Welfare. The words of the bill (H.R. 3606, 92nd Congress, first session; Sec. 9) are:

> The Institute shall be headed by a Director who shall be appointed by the President with the advice and consent of the Senate. The Director shall perform such duties as are prescribed by the Secretary of Health, Education, and Welfare.

In an earlier report, the National Academy of Education went on record as favoring the creation of a cabinet post with a Secretary of Education.[1] Were that to eventuate, presumably both the Commissioner of Education and the Director of NIE would report to the Secretary of Education. This would be our preferred arrangement, but in the meantime we are satisfied to have the Director of the NIE report to the Secretary of Health, Education, and Welfare during the period of NIE's initial operation. Because of the heavy demands on the Secretary's time and interest, however, we do not believe that it would be wise to assume that the NIE can reasonably expect to receive the Secretary's active attention for more than a few years. We therefore recommend that lines of authority be reviewed during the third year after NIE's formal establishment.

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1. Committee on Educational Policy, National Academy of Education (Roald F. Campbell, Chairman). Policy Making for American Public Schools. Syracuse, N.Y.: National Academy of Education, March 1969, pages 16-18.

In addition, the independence of NIE should be symbolized not only by the organizational position but by the process of choosing the Director of NIE, whose standing in the research community should be unassailable.

The leadership of NIE. Our committee believes that the Director of NIE requires a competence and orientation different from that of the Commissioner of Education and more like that of the leadership of NIH, NSF, or the Bureau of Standards. We urge that the process of selection be similar to that used in choosing the director of NSF.

Initial administrative structure. Because the ultimate quality of the NIE will hinge upon the ability and distinction of those who guide it, the initial administrative leadership is of paramount importance. The Deputy Director and Assistant Directors should be carefully selected for their distinction as educator-scholars and research scientists, and for their eminence in the educational and scholarly community. They should not be invited to fill positions in a pre-established organization chart; they should be chosen for their individual qualities rather than for their "fit" to a predesigned "slot." It may be necessary to assign some sort of function as a formality, but there should be clear understanding that these assignments will be subject to change as the organization matures. If the right persons can be attracted to these posts, much of the organization can be built around them, or designed by them. The importance of care in this initial selection, and flexibility in the organizational pattern after the selection has occurred, cannot be overemphasized. Hence any hasty filling of positions on a chart, either those high on the chart or those for staff members below, is to be avoided.

One possibility is to include in the early administrative structure some short-term appointments of scholar-administrators who might be persuaded to serve for a year or two, leaving temporarily positions which they would be reluctant to relinquish permanently. Their wisdom

in selecting colleagues and in designing arrangements for their effective service would prove beneficial to the development of NIE. With this in mind, provision was made for them in the budget of Table 2.

Programs transferred from OE. As indicated earlier, we believe that the transferred programs should remain as nearly intact as possible, in order to avoid the sorts of disruptions that have occurred in OE in recent years. Some of the programs may well be modified after a time, to conform with the direction the research emphasis in NIE may take, but such changes should be made in light of standing commitments.

The National Laboratory of Education. This new laboratory should be of top quality above all else. There should be enough high-level personnel, (perhaps 30 to 50 senior investigators) to represent the range of approaches to educational R & D and to permit the development of an exemplary community of scholars.

The question of what proportion of the research capability of NIE should be intramural and what proportion extramural cannot be answered definitely, but again there are precedents in other agencies that may be cited. The relative sizes of intramural and extramural programs in OE, NIH, and NSF are shown in Table 6. The following relationships may be noted. Even though NSF has moved slowly in developing intramural programs, the proportion of these has increased over the years, relative to the constant percentages for OE. The intramural programs of NIH are more substantial, and they have been growing also, relative to extramural programs.

The figures of Table 6 suggest a caution. In times of "belt-tightening" intramural programs tend to be favored over extramural ones, for it is more difficult to dismiss in-house personnel than to grant fewer projects to outside recipients. Because of this readily understood tendency, the in-house programs should be kept small in relation to outside ones, so that the competition for funds between intramural and extramural programs will not become a major issue. The intramural programs should be

Table 6

Funds Obligated for
Intramural and Extramural
Research and Development
(thousands of dollars)

Agency		1969		1970 (est.)		1971 (est.)	
		$(000's)	%	$(000's)	%	$(000's)	%
Office of Education	Total	96,778	100	87,994	100	119,858	100
	Intramural	4,700	5	4,801	5	5,419	5
	Extramural	92,078	95	83,193	95	114,439	95
National Institutes of Health	Total	892,925	100	862,679	100	959,492	100
	Intramural	158,898	18	180,559	21	206,399	22
	Extramural	734,027	82	682,120	79	753,093	78
National Science Foundation	Total	273,780	100	294,173	100	364,004	100
	Intramural	15,010	5	18,080	6	28,699	8
	Extramural	258,780	95	276,093	94	335,305	92

Source: Federal Funds for Research, Development, and Other Scientific Activities. Fiscal Years 1969, 1970, 1971. National Science Foundation, NSF 70-38, Volume XIX, 1970.

supported at a sufficiently high level to meet the criterion of "critical mass," but an excellent program need not be a very large one. Such considerations lie behind our proposing a modest initial budget for the National Laboratory of Education(Table 2).

Intramural and extramural research. We earlier proposed that the percentage of total R & D budget assigned to basic research should be roughly the same for intramural and extramural research. This is based in part on our belief that there should be a balance between the intramural and extramural capabilities, so that in-house scientist-scholars can double as high-level advisers and planners for research programs that might be funded extramurally. There is also an empirical base for this suggestion, in that Federal agencies supporting intramural and extramural research do, in fact, tend to assign their intramural and extramural funds to basic research in grossly similar proportions (Table 7).

The range of educational R & D. The choice of the original small group of top administrators for NIE should reflect the intent to comprise R & D pertinent to the whole of the educational enterprise, including not only preschool, elementary, secondary, and higher education, but whatever new areas emerge in community education and in continuing education, adult education, and education within industry. This does not mean that one person has to be selected for each of the more important fields, but rather that some diversity in the experience of those in top administration is essential if a balanced program is to develop. Because of its under-representation in educational research generally, special care may be needed to find someone appropriately experienced in R & D in higher education.

Program evaluation. Educational innovation, like any other social or technological innovation, has to be evaluated for both its direct and indirect effects. It does not matter whether the new program is one based largely on imaginative design or one that follows as a

Table 7

Basic Research, Applied Research, and Development within Intramural and Extramural Funds, 1971 (Est.)

Agency		Total		Intramural		Extramural	
		$(000's)	%	$(000's)	%	$(000's)	%
	Total	119,858	100	5,419	100	114,439	100
Office of Education	Basic	6,771	6	671	12	6,100	5
	Applied	54,906	46	2,063	38	52,843	46
	Development	58,181	48	2,685	50	55,496	49
National Institutes of Health	Total	959,492	100	206,399	100	753,093	100
	Basic	294,650	31	89,814	43	204,836	27
	Applied	657,490	68	115,835	56	541,655	72
	Development	7,352	1	750	1	6,602	1
National Science Foundation	Total	364,004	100	28,699	100	335,305	100
	Basic	293,239	81	17,302	60	275,937	82
	Applied	55,304	15	10,198	36	45,106	14
	Development	15,461	4	1,199	4	14,262	4

Source: Federal Funds for Research, Development, and other Scientific Activities. Fiscal Years 1969, 1970, and 1971. National Science Foundation, NSF 70-38, Volume XIX, 1970.

consequence of research findings: there is never any guarantee that a program does what it is expected to do or, if it does, that it will not have some unforeseen and undesirable consequences. Hence educational R & D will necessarily include a large measure of evaluative effort, and NIE will doubtless have a high order of competence in evaluating its own innovative programs.

The very competence of NIE in evaluation will raise a policy question. Should NIE be ready to take on the task of evaluating programs initiated within OE or within other agencies of the Federal government? We have considered this question and believe it should be made clear from the outset that NIE will not accept the task of evaluating programs initiated by other agencies, including OE. It might advise about the competency of other selected organizations to handle contracts for such evaluations, but it should not take the evaluative assignment itself. The reasons are obvious; if NIE is drawn into an adversary role it becomes involved in power struggles unsuited to a research agency.

The linkages of NIE to OE and to the field of practice. We have deliberately rejected the decentralized administrations represented in the Report's Models VI and VII, except to the extent that the existing Regional Laboratories serve the same functions. To develop these laboratories of dissemination and implementation as the primary mechanisms would require a network of Regional laboratories covering the entire country, and this development would seem to us neither wise nor feasible.

The building of close links to practice, however, is not only desirable but essential. It is necessary if NIE is to pursue investigations that are truly addressed to the more pressing problems of American education. And it is necessary if the fruits of NIE investigations are ultimately to affect the actual conduct of American education. To

repeat an earlier point (page 14), in education even more than elsewhere, perhaps, the receptivity of the user to the outcomes of R & D is of crucial importance if R & D effort is ultimately to lead to improvement.

We believe that in general OE itself is best equipped to handle relations with school administrators, supervisors, and classroom teachers, and that to transfer these functions from OE to NIE would create an undesirable imbalance in the latter agency as between managerial and R & D efforts. But we strongly urge that a small staff within the headquarters of NIE take unto itself the "brokerage functions" that are needed to relate NIE to OE's network of field relations. On the one hand, it is important that OE not be weakened through the creation of NIE; on the other hand, it is crucial that NIE make effective and indeed imaginative uses of OE's long-established and wide-ranging linkages with the on-going programs of American education.

6. HOW THESE PROPOSALS BEAR ON THE REPORT UNDER REVIEW

The integrative model incorporates many of the ideas in the Report. The proposed model embodies much of Models I and V, and there are numerous elements from the other five models.

At the same time, certain of the ideas in the Report were definitely rejected, either explicitly or implicitly. Among these are the following:

a. We have rejected the idea of formula grants to which state and local contributions are made, as proposed in the unfinished Model VI.

b. We have rejected the decentralized type of management through Regional Councils, in which school administrators and other practitioners are heavily involved, as suggested in Model VII.

Our supplementation has come through specific recommendations that take into consideration historical precedents and parallels, both inside and outside OE, with due recognition that the NIE is <u>not</u> to be a totally novel enterprise.

7. SUMMARY OF RECOMMENDATIONS

This section contains nothing not previously discussed, but in the interest of clarity states without qualification some of the conclusions from the body of this review.

1. The Report under review accepts the educational R & D interpretation of the role of the NIE. We favor this position.

2. Educational R & D should be interpreted as covering the entire age range, and a variety of educational institutions, so that it includes, in addition to primary and secondary schooling, higher education, adult education, and education as it proceeds via public television, libraries, and museums.

3. The Director of NIE should be co-equal in status with the Commissioner of Education and should report to the Secretary of Health, Education, and Welfare. While we prefer a cabinet post for a Secretary of Education, we do not consider this essential to the viability of NIE. We do, however, urge that lines of authority be reviewed during the third year after NIE's formal establishment.

4. The Director of NIE should be chosen for his competence in educational R & D and his eminence in the community of educational scholars. He should be comparable in stature to the Director of NIH or of NSF.

5. The components of the new NIE, as proposed in our integrated model should be:

(1) R & D Centers and Regional Laboratories

(2) A National Educational Laboratory

(3) Extramural R & D, supporting investigator-initiated grants and programmatic research

(4) Research manpower training

(5) Institutional development for research

(6) Functions specifically transferred from OE

6. In planning R & D that will cover a wide spectrum of research, it is important to protect a small but specified portion of the budget for basic research fundamental to the problems of education. We suggest an arbitrary figure of 10 to 15 percent of the R & D budget, both intramural and extramural, which is not out of line with current Federal emphases on applied research.

7. Although NIE must develop evaluative competence of high order, it should not accept assignments to appraise educational innovations initiated by other Federal agencies, including OE, lest it be drawn into an adversary role inappropriate to a research agency.

8. While linkages to the field are of the first importance, we believe that OE should retain the primary role in this realm, although NIE should have a small headquarters staff concerned with the "Brokerage functions."

9. We have not included a table of organization paralleling those in the Report under review because we think such a table would be premature at this stage. We believe that the functions transferred from OE should preserve their present organization to the extent that this is feasible, in order to avoid disruption and demoralization. For the rest, some flexibility of organization should be maintained until the nature and scope of operations become better defined.